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Observations of the Moon, made at the Radcliffe Observatory, Oxford, during the year 1888, *and a Comparison of the Results with the Tabular Places from Hansen's Lunar Tables.* By E. J. Stone, Esq., M.A., F.R.S., Radcliffe Observer.

The present paper contains the right ascensions and north polar distances of the Moon, as deduced from the observations made at the Radcliffe Observatory during the year 1888. These results are here compared with those deduced from Hansen's Lunar Tables on two suppositions :—

(1) That the mean times, found in the usual way from the sidereal times at mean noon, given in the *Nautical Almanac*, were *not* changed in 1864 by the adoption of a different unit of time.

(2) That these mean times *were* changed by the adoption of a different measure of time in 1864 to fix the positions of the clock stars relatively to the Sun, in accordance with the views which I have explained in papers communicated to the Society.

It will be seen that the mean annual error of Hansen's Tables from 1847 to 1863 is $-1''\cdot30$, and that no law of regular increase is apparent; but that, with the argument in the Tables taken out in the usual way, the mean annual error has since increased at an average rate of $0''\cdot73$ per annum, the error now amounting to about $+17''$. The mean annual error of Hansen's Tables from 1864 to 1888 taken out with the *corrected* argument is $-1''\cdot28$, which is almost identically the same as the mean error between 1847 and 1863.

For facilities for an accurate comparison between Hansen's Lunar Tables and observations we are again indebted to the places published in the *Connaissance des Temps.*

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TABLE I.

Radcliffe Observations of the Moon, 1888.

Day, 1888.	Correction to be subtracted from M.T. for change of Sidereal Time at Mean Noon since 1864. s	Observer.	Observed R.A. h m s	Seconds of Hansen's R.A. s	Hansen *minus* Observed. **Uncorrected** for Error in Time. s	Correction due to Error in Time. s	Hansen *minus* Observed. **Corrected** for Error in Time. s	Observed N.P.D. ° ′ ″	Seconds of Hansen's N.P.D. ″	Hansen *minus* Observed. **Uncorrected** for Error in Time. ″	Correction due to Error in Time. ″	Hansen *minus* Observed. **Corrected** for Error in Time. ″
Jan. 23	35·73	W.	4 4 24·84	25·71	+0·87	−1·22	−0·35	74 10 47·65	43·82	−3·83	+4·11	+0·28
26	35·74	W.	6 48 16·55	17·53	+0·98	−1·39	−0·41	69 32 20·94	19·90	−1·04	−0·04	−1·08
27	35·75	R.	7 46 56·48	57·56	+1·08	−1·41	−0·33	70 11 1·40	3·02	+1·62	−1·82	−0·20
Feb. 1	35·77	F. B.	12 35 18·51	19·73	+1·22	−1·33	−0·11	88 55 49·42	51·87	+2·45	−7·44	−4·99
25	35·86	F. B.	9 16 22·84	24·13	+1·29	−1·42	−0·13	73 29 3·61	7·46	+3·85	−4·47	−0·62
Mar. 21	35·96	F. B.	6 52 24·05	24·98	+0·93	−1·35	−0·42	69 20 57·12	56·55	−0·57	−0·19	−0·76
April 2	36·01	R.	18 44 41·76	43·27	+1·51	−1·45	+0·06	110 45 14·50	14·28	−0·22	−0·04	−0·26
26	36·11	W.	15 8 42·41	43·93	+1·52	−1·50	+0·02	102 35 43·30	48·49	+5·19	−6·68	−1·49
30	36·12	R.	19 22 9·40	10·98	+1·58	−1·47	+0·11	110 46 27·72	26·63	−1·09	+1·14	+0·05
May 18	36·19	R.	9 54 29·76	30·34	+0·58	−1·33	−0·75	75 9 13·40	15·29	+1·89	−5·25	−3·36
21	36·21	F. B.	12 40 2·47	3·40	+0·93	−1·36	−0·43	89 15 19·02	23·48	+4·46	−7·91	−3·45
23	36·21	F. B.	14 36 24·76	25·94	+1·18	−1·47	−0·29	100 0 58·25	64·43	+6·18	−7·34	−1·16
25	36·22	R.	16 42 21·76	23·00	+1·24	−1·57	−0·33	108 17 46·27	49·71	+3·44	−4·29	−0·85
June 18	36·32	W.	13 13 59·98	60·80	+0·82	−1·35	−0·53	92 21 41·73	45·68	+3·95	−7·78	−3·83
19	36·32	R.	14 10 14·58	15·27	+0·69	−1·39	−0·70	97 37 23·86	28·23	+4·37	−7·49	−3·12

K 2

Day, 1888.	Correction to be subtracted from M.T. for change of Sidereal Time at Mean Noon since 1864.	Observer.	Observed R.A.	Seconds of Hansen's R.A.	Hansen *minus* Observed. **Uncorrected** for Error in Time.	Correction due to Error in Time.	Hansen *minus* Observed. **Corrected** for Error in Time.	Observed N.P.D.	Seconds of Hansen's N.P.D.	Hansen *minus* Observed. **Uncorrected** for Error in Time.	Correction due to Error in Time.	Hansen *minus* Observed. **Corrected** for Error in Time.
	s		h m s	s	s	s	s	° ′ ″	″	″	″	″
June 25	36·35	W.	20 27 4·56	6·20	+1·64	−1·48	+0·16	109 31 4·40	2·25	−2·15	+3·14	+0·99
July 20	36·45	R.	17 50 16·57	17·65	+1·08	−1·55	−0·47	110 34 15·22	16·22	+1·00	−2·06	−1·06
23	36·46	W.	20 58 8·47	10·09	+1·62	−1·44	+0·18	108 15 52·84	49·30	−3·54	+4·00	+0·46
26	36·47	R.	23 39 44·55	45·72	+1·17	−1·21	−0·04	96 44 42·23	35·31	−6·92	+6·64	−0·28
Aug. 18	35·56	F. B.	19 32 12·19	13·54	+1·35	−1·50	−0·15	110 56 17·92	15·30	−2·62	+1·40	−1·22
22	36·58	W.	23 17 35·47	36·80	+1·33	−1·25	+0·08	98 40 38·67	32·64	−6·03	+6·54	+0·51
23	36·58	F. B.	0 7 6·04	7·47	+1·43	−1·20	+0·23	94 7 48·19	42·59	−5·60	+6·84	+1·24
Sept. 12	36·66	W.	17 9 15·87	17·28	+1·41	−1·50	−0·09	109 32 49·47	52·99	+3·52	−3·32	+0·20
13	36·67	R.	18 10 59·82	61·03	+1·21	−1·51	−0·30	111 7 28·98	31·07	+2·09	−1·28	+0·81
17	36·68	W.	22 5 23·75	25·01	+1·26	−1·32	−0·06	104 24 9·69	6·15	−3·54	+5·49	+1·95
19	36·69	W.	23 47 30·73	31·97	+1·24	−1·21	+0·03	95 55 47·98	41·58	−6·40	+6·79	+0·39
20	36·69	R.	0 35 40·96	42·03	+1·07	−1·18	−0·11	91 17 25·74	19·02	−6·72	+6·92	+0·20
Oct. 11	36·78	R.	18 53 52·68	54·03	+1·35	−1·53	−0·18	111 37 59·57	58·13	−1·44	+0·15	−1·29
15	36·79	R.	22 41 10·66	11·91	+1·25	−1·26	−0·01	101 51 49·32	43·71	−5·61	+6·11	+0·50
17	36·80	R.	0 19 3·11	4·21	+1·10	−1·17	−0·07	92 56 59·91	53·89	−6·02	+6·93	+0·91
20	36·81	F. B.	2 39 27·46	28·65	+1·19	−1·17	+0·02	79 31 13·66	10·15	−3·51	+6·01	+2·50

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Day, 1888.	Correction to be subtracted from M.T. for change of Sidereal Time at Mean Noon since 1864.	Observer.	Observed R.A.	Seconds of Hansen's R.A.	Hansen *minus* Observed. **Uncorrected** for Error in Time.	Correction due to Error in Time.	Hansen *minus* Observed. **Corrected** for Error in Time.	Observed N.P.D.	Seconds of Hansen's N.P.D.	Hansen *minus* Observed. **Uncorrected** for Error in Time.	Correction due to Error in Time.	Hansen *minus* Observed. **Corrected** for Error in Time.
	s		h m s	s	s	s	s	° ′ ″	″	″	″	″
Oct. 22	36·82	R.	4 16 12·52	13·62	+1·10	−1·23	−0·13	72 34 58·28	55·64	−2·64	+4·16	+1·52
23	36·83	F. B.	5 6 41·72	42·92	+1·20	−1·27	−0·07	70 11 21·64	21·15	−0·49	+2·92	+2·43
Nov. 13	36·91	F. B.	0 4 30·61	31·85	+1·24	−1·18	+0·06	94 32 61·26	55·75	−5·51	+6·92	+1·41
16	36·92	F. B.	2 23 49·37	50·51	+1·14	−1·16	−0·02	80 54 38·65	33·76	−4·89	+6·29	+1·40
17	36·93	R.	3 11 0·90	1·87	+0·97	−1·19	−0·22	76 55 30·80	25·21	−5·59	+5·57	−0·02
20	36·94	F. B.	5 41 11·13	12·37	+1·24	−1·30	−0·06	68 55 28·07	24·66	−3·41	+2·05	−1·36
25	36·96	R.	10 7 55·77	56·87	+1·10	−1·31	−0·21	75 12 20·37	23·11	+2·74	−5·61	−2·87
27	36·97	R.	11 53 32·93	33·98	+1·05	−1·32	−0·27	84 14 52·81	59·08	+6·27	−7·67	−1·40
Dec. 7	37·01	R.	21 8 54·40	55·66	+1·26	−1·47	−0·21	108 29 54·49	50·07	−4·42	+4·51	+0·09
11	37·02	F. B.	0 36 21·22	22·43	+1·21	−1·17	+0·04	91 34 52·32	47·89	−4·43	+7·07	+2·64
12	37·03	R.	1 22 42·37	43·21	+0·84	−1·15	−0·31	86 54 23·45	18·24	−5·21	+6·90	+1·69
13	37·03	F. B.	2 8 46·53	47·89	+1·36	−1·15	+0·21	82 25 12·29	7·93	−4·36	+6·50	+2·14
26	37·08	W.	13 19 22·37	23·79	+1·33	−1·33	0·00	92 41 23·28	30·97	+7·69	−8·03	−0·34
Mean of Errors, without regard to sign			...	...	s **1·185**	...	s **0·204**	... ...	...	″ **3·830**	...	″ **1·348**
Mean Errors for Year ...		...	...	...	**+1·185**	...	**−0·149**					

Observers: W., Mr. W. Wickham; R., Mr. W. H. Robinson; F. B., Mr. F. A. Bellamy.

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TABLE II.

Radcliffe Observations of the Moon, 1888.

Errors of the Moon's Tabular Place in Longitude and Ecliptic Polar Distance. **Uncorrected** *and* **Corrected** *for the change in Tabular Mean Time introduced in the year* 1864.

Day, 1888.		Errors of Longitude (Hansen *minus* Observed).		Errors of E.N.P.D. (Hansen *minus* Observed	
		Uncorrected.	**Corrected.**	**Uncorrected.**	**Corrected.**
		″	″	″	″
Jan.	23	+13·11	− 5·03	−1·33	−0·70
	26	+13·64	− 5·83	−2·17	−0·60
	27	+15·32	− 4·63	−1·12	+0·63
Feb.	1	+17·89	− 3·50	−4·95	−3·95
Feb.	25	+18·86	− 1·97	−1·90	−0·03
March	21	+12·98	− 5·95	−1·74	−0·23
April	2	+21·14	+ 0·86	+1·40	−0·19
April	26	+22·93	− 0·12	−1·08	−1·52
	30	+22·15	+ 1·52	+2·03	+0·27
May	18	+ 8·56	−11·38	−1·08	+0·54
	21	+14·67	− 7·33	−1·37	−0·64
	23	+18·57	− 4·45	+0·46	+0·23
	25	+17·99	− 4·78	+1·06	−0·22
June	18	+12·92	− 8·84	−1·00	−0·53
	19	+11·19	−10·91	+0·65	+0·57
	25	+23·03	+ 1·96	+3·47	+1·50
July	20	+15·20	− 6·63	+0·73	−0·94
	23	+23·14	+ 2·33	+3·03	+1·16
	26	+18·80	− 0·44	+0·57	−0·49
Aug.	18	+19·11	− 1·88	+0·35	−1·53
	22	+20·54	+ 0·89	+2·19	+0·93
	23	+21·98	+ 2·68	+3·40	+2·52

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Day, 1888.		Errors of Longitude (Hansen *minus* Observed).		Errors of E.N.P.D. (Hansen *minus* Observed).	
		Uncorrected.	**Corrected.**	**Uncorrected**	**Corrected.**
		″	″	″	″
Sept.	12	+20·22	−1·25	+1·80	+0·31
	13	+16·90	−4·21	+2·39	+0·73
	17	+18·41	−1·50	+3·10	+1·52
	19	+19·60	+0·25	+1·50	+0·54
	20	+17·50	−1·60	+0·13	−0·47
Oct.	11	+18·90	−2·38	+0·32	−1·52
	15	+19·14	−0·32	+1·69	+0·41
	17	+17·64	−1·33	+1·01	+0·42
	20	+17·85	−0·49	+2·03	+2·47
	22	+15·99	−2·10	+0·15	+1·17
	23	+16·93	−1·22	+1·07	+2·33
Nov.	13	+19·29	+0·26	+2·34	+1·65
	16	+17·64	−0·74	+0·83	+0·23
	17	+15·21	−3·10	−1·58	−0·88
	20	+17·48	−0·80	−2·86	−1·39
	25	+15·92	−3·87	−3·04	−1·61
	27	+16·94	−4·27	−0·50	+0·32
Dec.	7	+18·44	−2·88	+1·00	−0·79
	11	+18·55	−0·49	+3·07	+2·67
	12	+13·67	−4·96	−0·11	−0·17
	13	+20·59	+2·22	+2·75	+3·07
	26	+21·46	−0·13	−0·35	−0·31
Mean of Errors, without regard to sign		**...17″·682**	**3″·052**	**1″·607**	**1″·020**
Mean Errors for Year		**+17″·682**	**−2″·462**		

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Table III.

Mean Excess over Observation of the Moon's Tabular Place in Longitude for the years 1847 *to* 1888, *as computed from Hansen's Tables.*

Uncorrected *and* **Corrected** *on and after* 1864 *for the change in Tabular Mean Time introduced in the year* 1864.

Year.	Errors of Longitude (Hansen *minus* Observed). **Uncorrected.**	 **Corrected.**
	″	″
1847	+ 1·07	+ 1·07
1848	+ 0·20	+ 0·20
1849	− 0·47	− 0·47
1850	− 0·28	− 0·28
1851	− 1·29	− 1·29
1852	− 0·92	− 0·92
1853	− 1·63	− 1·63
1854	− 1·68	− 1·68
1855	− 0·87	− 0·87
1856	− 0·96	− 0·96
1857	− 1·86	− 1·86
1858	− 1·98	− 1·98
1859	− 1·80	− 1·80
1860	− 2·90	− 2·90
1861	− 2·19	− 2·19
1862	− 2·83	− 2·83
1863	− 1·61	− 1·61
1864	+ 0·12	− 0·81
1865	+ 1·27	− 0·22
1866	+ 2·14	− 0·22
1867	+ 3·48	+ 0·36
1868	+ 4·12	+ 0·28
1869	+ 4·28	− 0·35
1870	+ 4·83	− 0·66
1871	+ 6·96	+ 0·44
1872	+ 7·31	+ 0·10
1873	+ 8·24	+ 0·20
1874	+ 9·29	+ 0·56
1875	+ 9·87	+ 0·36
1876	+ 9·80	− 0·50
1877	+ 9·23	− 1·90
1878	+ 8·22	− 3·60
1879*	+ 9·63	− 3·12
1880	+ 10·89	− 2·77
1881	+ 10·51	− 4·06
1882†	+ 12·68	− 2·51
1883	+ 14·71	− 1·50
1884	+ 14·65	− 1·91
1885	+ 15·20	− 1·82
1886	+ 15·34	− 2·53
1887	+ 15·70	− 3·25
1888‡	+ 17·68	− 2·46

* All to 1879, Greenwich observations.
† 1880 to 1882, Mean of Greenwich and Radcliffe.
‡ 1883 and since, Radcliffe only.

Radcliffe Observatory, Oxford:
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